

Nutritional Survey of Rural Families in Jequitibá, Brazil, 1957-58

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In 1956, I was asked to plan and help organize a nutritional survey in several areas of the State of Minas Gerais, Brazil, in which ACAR was working. The request was made by the directors of ETA. The survey was conducted to find out what the people were eating and to determine their general health and nutritional status as a basis for planning an educational program in nutrition and health to be executed by the ACAR field staff.

After an orientation trip in May 1956 through various regions in which ACAR was working, it was decided to make a pilot survey near Sete Lagoas, 60 kilometers (37½ miles) north of Belo Horizonte and the site of an ACAR office. The following criteria were used in the final selection of the area:

1. It should be readily accessible to researchers operating from a convenient base.
2. It should be a typical work area of ACAR, with families of borrowers and non-borrowers more or less evenly distributed. (The term "borrowers" refers to families receiving both technical and financial assistance from ACAR; "non-borrowers," to those receiving technical but not financial assistance from ACAR.)
3. There should be enough other families of

approximately the same economic level in the area who had never been in contact with ACAR to form a kind of control group.

Jequitibá, the county neighboring on Sete Lagoas to the north and east, fulfilled those criteria and was selected as the survey area. Jequitibá lies on both sides of the Rio das Velhas, which flows from southeast to northwest. ACAR technicians from the Sete Lagoas office were working with families living west of the river but with none on the east side.

The average elevation in Jequitibá is between 650 and 750 meters (2,140 to 2,460 feet) above sea level. Most of the area is rugged, hilly country. Soil fertility varies from good to very poor. The climate is generally agreeable, with only small differences in temperature from summer to winter. Rainfall is concentrated from November to April and is much less than in the southern part of the State.

The principal crops are corn, rice, beans, sugarcane, and manioc (cassava). Beef and dairy cattle, hogs, horses, mules, and poultry also are produced. Milk production reaches 2.2 million liters (nearly 2.3 million quarts) per year, most of which goes to the creamery in Sete Lagoas for making butter, cheese, and dried milk. The small amount of home industry consists mainly of primitive installations to grind corn and manioc and to make raw sugar.

More than 80 percent of the 10,390 people in

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the county are dispersed throughout the rural area. The county seat has a church, a club, and a movie theater. There are 21 rural schools in the county, maintained by the county government. Official statistics show that 12.8 percent of the population above the age of 10 is illiterate. Government health services reach the rural dwellers only when they go to health centers in the towns. Federal and State agricultural services give some help to farmers.

Since ACAR works mostly with the small landholder, the pilot survey was limited to this group. These farmers generally have 20 to 50 hectares (49 to 123 acres) of land, and this was adopted as the main criterion for the selection of the 54 families to be studied. For borrowers, accurate information on size of property was available at the ACAR office in Sete Lagoas; for non-borrowers and the control group, the only information available was in the tax collector's office. These records were not always accurate because, for tax reasons, farmers often understated the size of their property. Size of property, however, is not always the best measure for selecting a sample of families of the same economic level, since economic values of land depend on its fertility and the use the owner makes of it. Usage as well as amount of land was considered in selecting an economically homogeneous sample.

Participants

In 1957, 54 families, composed of 419 persons, participated in the survey; in 1958, only 50 families, composed of 344 persons, took part. Four large families had moved or were absent from the county during the second survey. The mean number of persons per family was 7.7.

The 54 families selected for study represent only 26 percent of all property owners in the county, and 49 percent of these are submarginal. They were divided into three groups of 18 families each, as follows:

Group 1. ACAR borrowers: All families in Jequitibá receiving financial as well as technical assistance from ACAR were included.

Group 2. Non-borrowers: Families were chosen from the larger number in the county to which ACAR was providing technical but not financial assistance. They were selected on

Definitions

The Associação de Crédito e Assistência Rural (ACAR) is an extension organization which began work in 1949, using supervised credit as one of the tools in its rural development program. It was founded jointly by the Minas Gerais State Government and the American International Association for Economic and Social Development (AIA), a Nelson Rockefeller nonprofit entity. At the end of 1958, ACAR had more than 60 local offices in the rural areas of Minas Gerais, each office being staffed by a farm supervisor and a home economist.

Escritório Técnico de Agricultura Brasil-Estados Unidos (ETA) is a joint project of the U.S. Government's point 4 organization and the Brazilian Ministry of Agriculture, working in many fields of agricultural improvement in Brazil. It has participated in ACAR since 1955, making major contributions in both funds and technical assistance.

the basis of their socioeconomic similarity to the borrower families, and the location of their properties in areas similar to those in which the other groups lived.

Group 3. Families having no contact with ACAR and living on the east bank of the river: These were chosen by lot after eliminating all families living on farms of 20 to 50 hectares which were difficult to reach or were very dissimilar to the farms in the other two groups.

Before starting collection of the data, each of the three doctors on the survey team examined the same 20 boys in an orphanage in Belo Horizonte and compared their findings in order to determine individual variations in grading and to obtain close agreement on diagnostic criteria. This assured a high degree of uniformity in the clinical examinations. All three physicians had previous training in clinical nutrition. Since the women on the team had worked as home economists of ACAR for 1 year or more, they were reasonably well prepared for their part in the survey. Before starting the collection of the data, the members of the team were given detailed instructions on the techniques to be used.

The survey team began collecting the following data in July 1957:

Table 1. Age and sex distribution of persons examined by a physician by study group,¹ 54 families in Jequitibá, Brazil, 1957 and 1958

Age group (in years)	Group 1				Group 2				Group 3			
	Male		Female		Male		Female		Male		Female	
	1957	1958	1957	1958	1957	1958	1957	1958	1957	1958	1957	1958
Less than 1.....	3	0	0	0	1	0	0	0	0	0	0	0
1-4.....	4	5	9	8	15	11	7	7	11	8	4	4
5-9.....	10	7	12	8	17	12	9	9	15	11	10	9
10-14.....	5	5	7	9	10	9	11	8	10	8	8	4
15-19.....	8	7	8	6	6	4	12	7	4	1	10	6
20-29.....	11	11	9	8	1	0	5	7	3	3	14	12
30-39.....	5	6	7	6	4	5	7	6	4	3	3	2
40-49.....	8	7	4	3	7	6	4	3	4	3	7	7
50-59.....	2	2	4	4	3	1	2	2	4	3	2	2
60 or over.....	4	2	2	2	1	1	2	1	0	0	0	0
Total.....	60	52	62	54	65	49	59	50	55	40	58	46

¹ Group 1, borrowers from ACAR; group 2, non-borrowers; group 3, no contact with ACAR.

1. Reports on general socioeconomic conditions of the families, including conditions in the homes, were collected by the home economists on their visits.

2. Information on habits, superstitions, and food taboos were recorded by the home economists.

Seven-day food-consumption records of the families were kept daily by the housewife after instruction was given by the home economist, who later checked the records when she visited the family. (On the average, three visits were made during the week of the survey.)

4. Individual food intake was recorded during 3 weekdays. These records were checked on the first day by the home economist who weighed and measured individual portions of food and recorded the data on individual forms. On the other 2 days either the housewife or another responsible person did the weighing, measuring, and recording.

5. Data on the nutritional and health status of each individual were collected by the physician during an inspection of the home and recorded on a special form. Clinical examinations were supplemented by laboratory examinations of blood and fecal specimens. The hemoglobin was measured in blood specimens of all children aged 2 to 16 years by a laboratory technician who went to the home. Fecal samples were collected in the homes and

brought to the State public health center in Sete Lagoas, where they were examined for parasites.

Reports of the examinations were sent to Servico Especial de Saúde Pública, a Brazilian-American governmental agency working in public health in Rio de Janeiro, where they were tabulated in accordance with detailed instructions.

To determine whether some of the clinical findings were due to seasonal variations in the diet of these families, early in March 1958, 8 months after the first survey, a followup survey was made of the same families visited in July 1957. Data collected during the second survey consisted of 7-day food-consumption records and results of a second clinical examination in the homes, including laboratory tests for hemoglobin and parasites in the stool. These data

Table 2. Income and expenses, in cruzeiros, of 54 families in Jequitibá, Brazil, 1956

Income and expenses	Group 1	Group 2	Group 3
Median annual income.....	46, 393	34, 500	26, 800
Total expenses.....	15, 845	24, 470	11, 670
Home and fuel.....	2, 775	5, 370	1, 450
Food.....	6, 250	13, 100	6, 170
Medical care, including drugs.....	2, 000	1, 500	1, 050
Other.....	4, 820	4, 500	3, 000

were treated in the same way as those from the first survey, and a comparison was made between the two.

Table 1 shows for both surveys the age and sex distribution of persons in the three study groups who were examined by a physician. The age distribution for females was similar in the three groups, but there were considerably more males between 1 and 14 years of age in groups 2 and 3 than in group 1.

The distribution by color was similar in the three groups, with a slight preponderance of the white color over the mixed color (pardo) among the males of groups 1 and 2 and among the females of group 3. There were only nine individuals of true black color (two males and seven females).

About two-thirds of all the families had lost between one and five children through illness. More than one-fourth (27.1 percent) of all persons examined had already lost either father or mother or both.

More than three-fourths (78.7 percent) of all persons above the age of 6 were able to read and write, with group 1 showing the highest number. However, 9 percent did not give information on literacy.

The great majority of the men were farmers, and most of the women were housewives. Group 1 had the highest median income per family and group 3 had the lowest, whereas the total median expenses per family were highest in group 2. Table 2 shows median incomes and expenses per family in the three groups for 1956, given in cruzeiros, the Brazilian currency. At that time 1 U.S. dollar would bring about 70 cruzeiros.

Housing and Sanitation

The majority of the homes of families in groups 1 and 2 are built of bricks, whereas most of the homes of group 3 families are of adobe. The number of rooms varies from 4 to 19, with the median between 9 and 10 (usually 3 sleeping quarters) in all three groups. This seemingly high median should not be taken to indicate that the houses are comparable to 9- or 10-room homes in more developed parts of the world. Usually the rooms are small, sparsely furnished, and far from luxurious. The conditions of the home, kitchen, and stove are presented in table 3.

Table 3. Conditions of home and kitchen of 54 families in Jequitibá, Brazil, 1957-58

Unit	Percent		
	Good	Fair	Poor
Home in general (all groups)-----	20. 4	55. 6	24. 0
Kitchen (all groups)-----	5. 6	57. 4	37. 0
Stove (kitchen):			
Group 1-----	33. 3	44. 4	22. 3
Group 2-----	16. 7	50. 0	33. 3
Group 3-----	11. 1	38. 9	50. 0

A kitchen classified as "good" had: floor made of tiles, wood, or cement; clean, well-kept walls; closed cupboards for utensils, dishes, and food; adequate equipment for preparing and serving food; at least one window; an appropriate table or space to work; jars with tops for storage of staples (sugar, flour, coffee, beans, rice); and a stove with a chimney and oven. One described as "fair" was in passable but not in good condition, or lacked one of the listed items. A kitchen classified as "poor" was in generally bad condition, or lacked two or more of the listed items.

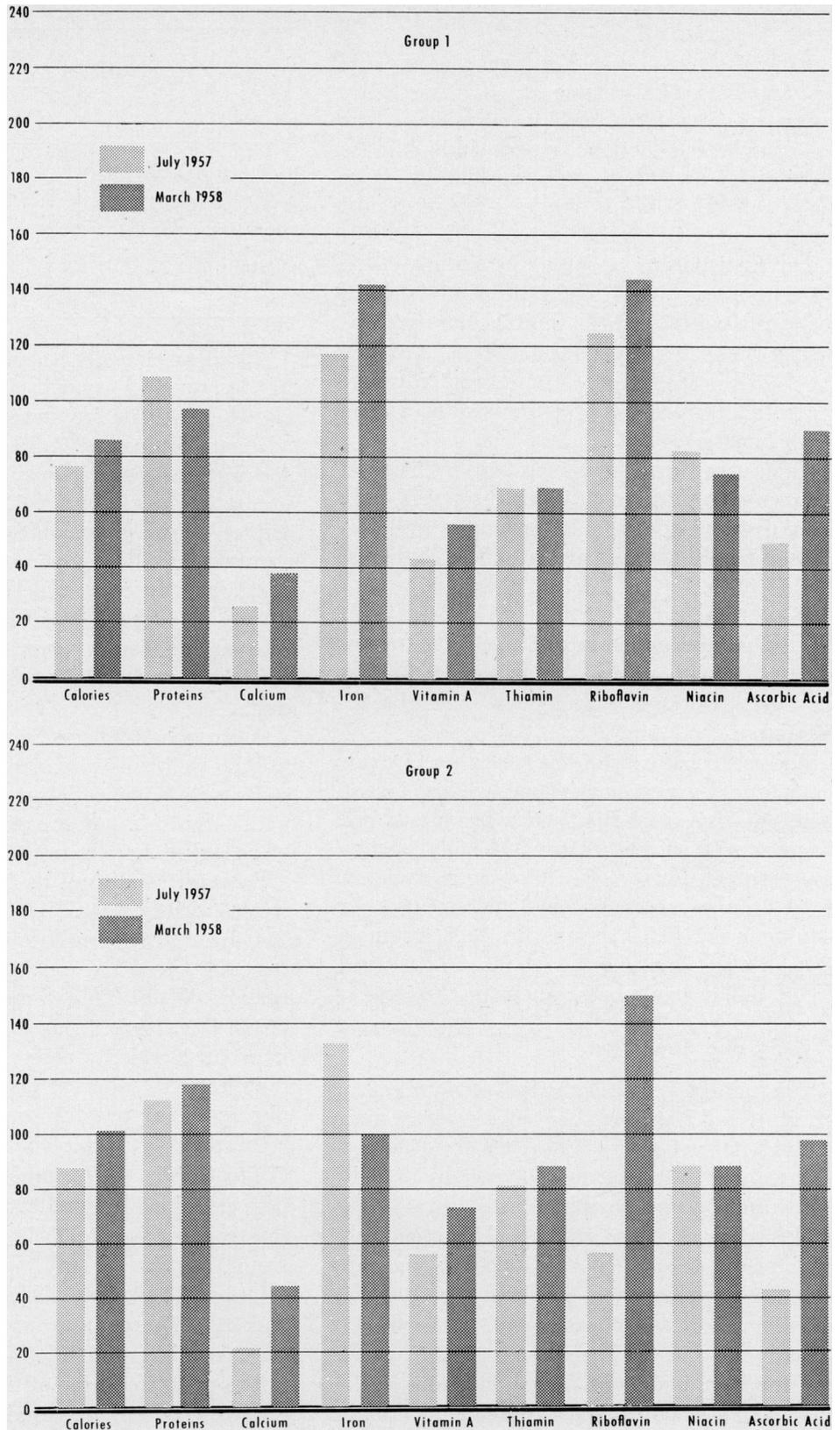
A stove called "good" was well kept, functioning well, with chimney and oven. A "fair" stove was in passable but not good condition, with either chimney or oven lacking. A "poor" stove lacked more than one item.

Sanitary conditions in the majority of homes were basically poor. The source of water for 63 percent of the families was a shallow creek; for 27.8 percent, a well; and for 9.2 percent, a spring. Water filters were used by 55.6 percent of the families in group 1, 11.1 percent of those in group 2, and 16.7 percent in group 3. Water samples were collected from 12 sources of supply and analyzed for fluorine content at the laboratory for water analysis of the State of Minas Gerais. All samples were distilled and then examined by standard methods. The fluoride content per 1,000 liters of water ranged from 0 to 0.7.

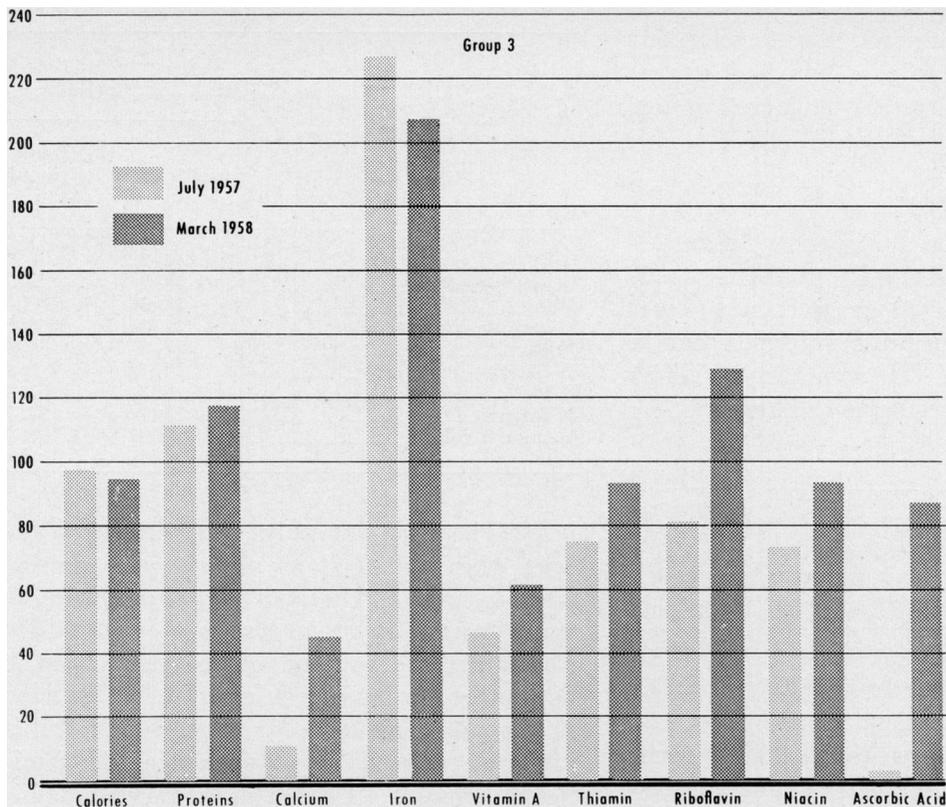
Only 38.9 percent of the families in group 1 and 16.7 of those in group 2 had privies; there were none in group 3.

The great majority of the homes in all three groups were without running water, electricity,

Percentage of mean nutritive values consumed by 54 families in Jequitibá, Brazil,



in relation to "normal" requirements for two seasons, July 1957 and March 1958



and radio, but did have sewing machines. More than 50 percent of the homes in groups 1 and 2 had a storeroom for food supplies whereas only 17 percent in group 3 had such rooms.

Food Economics

Expenditures for food were highest in group 2, while medical expenditures were highest in group 1 (table 2). In groups 1 and 3 the lowest earners spent a significantly higher percentage of their income for food than the highest earners. In group 2 these differences were less pronounced (table 4).

Table 4. Percentage of annual income spent for food by 54 families in Jequitibá, Brazil, 1956

Income group (cruzeiros)	Group 1	Group 2	Group 3
5,000-17,500	45.7	25.1	51.8
18,000-45,000	12.6	48.0	58.7
46,000-70,000	20.0	57.3	22.0
71,000-220,000	7.7	13.7	7.7

In order to see how the housewives spent their food cruzeiros, the investigators asked them to record the price of each item bought. About 20 percent of the daily food bill was spent for fats and oils (except butter), 12 percent for sugar, between 12 and 20 percent for meat, and between 10 and 12 percent for coffee. For all other items, they spent less than 10 percent.

All families raised some animals for food; most of them had chickens, pigs, and a few cows. Few families supplemented their meat supply through hunting, although some did fish (61 percent in group 2).

In July, the dry season, when the first survey was made, no family was without a vegetable garden, but most gardens contained only a few varieties, such as lettuce, onions, parsley, tomatoes, collards, and garlic, generally in small amounts. More families in group 1 planted these vegetables than in groups 2 and 3. Only a few families planted such vegetables as yellow squash, carrots, sweet peppers, and soybeans. The picture changed in March at the end of the rainy season, when there were

more vegetables and more varieties. Fruits grew in all yards, though only a few varieties. Almost all families had orange trees, some had banana plants, and only a few had guava, papaya, and avocado trees, with more families in group 1 having the last three.

Food Habits and Taboos

In their preference for specific foods, all three groups showed much uniformity, although more families in group 1 gave vegetables and eggs as their preferred foods than in the other two groups. Percentages of all 54 families preferring specific foods follow:

	<i>Percent</i>
Beef	87.0
Rice	72.2
Macaroni	59.3
Beans (dried).....	59.2
Vegetables in general.....	35.2
Eggs	29.6
White potatoes.....	27.7

Chicken was considered Sunday fare by 77.7 percent of the 54 families; macaroni, by 42.5 percent; and sweet desserts, by 26.7 percent. Families in group 2 showed a higher preference for macaroni on Sundays and holidays than those in the other two groups. Whereas four families in group 1 used the same type of food on Sundays as on weekdays, only one family in group 2 and one in group 3 did so. Leftovers were used by the great majority of the families either for supper or for feeding animals. Most families considered protein foods and vegetables of greater nutritional value than starchy foods (table 5).

There were some differences among groups in describing the "nature of food." For example, none of the families in group 3 called collards "hot"; only three families, 16.7 percent, in group 1 called pork "hot"; strawberries were called "hot" by 27.8 percent of the families in group 1 only. Rice was called "cold" by only 22.2 percent of the families in group 3. One third of the families in group 1 called manioc meal "cold." Only 11 percent of the families in group 2 called tomatoes "cold." The terms "hot" and "cold" are unexplainable since they do not refer to seasoning nor to temperature. More families in group 3 than in the other two groups, 83.3 percent, called black

Table 5. Nutritional evaluation of foods by 54 families of Jequitibá, Brazil, 1957

Food	Percent of families that consider food—	
	Of nutritional value	Without nutritional value
Beef.....	46.3	0
Beans (dried).....	38.9	3.7
Eggs.....	38.9	0
Vegetables in general.....	37.1	0
Milk.....	27.8	0
White potatoes.....	24.1	0
Rice.....	9.3	61.1
Macaroni.....	11.1	24.1
Manioc meal.....	2.0	18.5

beans "heavy," but only 11.2 percent called eggs "heavy." Yellow squash was considered a "food of the poor" by three times as many families in group 1 as in group 3. Rice was considered a "food of the rich" by 38.9 percent of the families in group 3, but by none in the other groups. Macaroni was called a "food of the rich" by 50 percent of the families in group 2. Table 6 shows how the families in all three groups ranked food by this folk designation.

The following food taboos were observed by the families:

<i>Taboos</i>	<i>Percent of 54 families</i>
Did not take milk with fruits.....	59.3
Did not change diet during influenza illness.....	62.9
Did not take fruits during fever.....	48.2

Considerably fewer families in group 1 than in groups 2 and 3 did not change their diet when they had the "flu" (44.4 percent compared with 72.7 percent), whereas more families in group 1 did not eat fruits during fever.

Mothers in the 54 families abstained from certain foods immediately after parturition as follows:

<i>Postnatal taboos</i>	<i>Percent of mothers</i>
Did not eat fruits.....	74.1
Did not eat meat.....	29.6
Did not eat eggs.....	79.6
Did not drink milk.....	59.3

In group 2, 50 percent of the mothers did not eat fruit during the postnatal period, while in

group 3 the figure was 94 percent. In group 1, 50 percent ate no meat during that period, except chicken. Group 3 showed the highest percentage, 83.3 percent, of those who did not drink milk at that time, and group 2 the lowest percentage.

Foods desired during the postnatal period by mothers in the 54 families are listed in order of preference.

<i>Food preferred (not actual consumption)</i>	<i>Percent of mothers</i>
Chicken.....	83.2
Rice.....	46.3
Beans (dried).....	38.6
Pork.....	35.5
Macaroni.....	29.6

Rice was preferred by almost twice as many women in group 3 who had just given birth as in group 1; dried beans were preferred by fewer mothers in group 2 than in the other two groups.

Food Consumption

Data on daily food consumption were obtained for 53 of the 54 families in the survey in July 1957 and for 49 of the 50 families surveyed in March 1958. Individual diet records were checked in July 1957 by weighing cooked portions of food for 1 day.

Seven-Day Family Diet Record

In 1957 there were significant differences in food consumption, based on the *t* test at the 5

percent level, in the three groups in their consumption of white wheat bread, fresh beef, milk (liquid), yellow squash, Irish potatoes, white wheat flour, refined sugar, and raw sugar (table 7). Similar differences, found during the second survey in March 1958, represent part of the food pattern of the families in the three groups. The differences in the consumption of inhamé, bananas, oranges, papayas, and condiments, apparent in July 1957, disappeared largely in 1958.

Differences within the same group during the two seasons varied from group to group for such items as milk, tomatoes, guavas, and Persian limes. They may reach significance in one group, but show little in another. Table 8 shows the mean nutritive value per unit of nutrition (1) corresponding to the total consumption during the two seasons.

The graphs show the percentage of the National Research Council allowances (2) in comparison with the nutritional intakes given in table 8. These graphs clearly reflect the influence of seasonal differences on the nutrition of these families.

Three-Day Individual Diet Record

The individual diet records checked by weighing cooked portions of food for 1 day in July 1957 showed good agreement with the 7-day family records for the B vitamins in all three groups, for calories in groups 1 and 3,

Table 6. Designation of nature of foods by 54 families of Jequitibá, Brazil, 1957

Food	Percent of families that described food as—					
	Hot	Cold	Heavy	Light	Of the poor	Of the rich
Pork.....	33.3	0	0	0	0	0
Leaf cabbage.....	16.7	5.6	11.1	1.7	7.4	1.7
Peanuts.....	29.6	0	0	0	0	0
Yellow squash.....	16.7	1.7	1.7	3.7	22.2	1.7
Okra.....	20.4	0	0	0	9.3	1.7
Lettuce.....	0	72.1	0	7.4	1.7	1.7
Rice.....	0	40.7	7.4	33.4	70.6	20.4
Manioc meal.....	0	16.7	5.1	0	11.1	0
Tomatoes.....	0	22.2	0	3.7	1.7	1.7
Macaroni.....	0	7.4	3.7	16.7	12.9	31.5
Black beans.....	11.1	0	64.8	1.7	87.0	5.6
Eggs.....	3.7	0	27.8	0	7.4	9.3
White potatoes.....	0	9.3	0	9.3	1.7	16.7
Milk.....	0	17	0	37.1	1.7	7.4
Corn meal mush.....	0	1.7	0	46.3	3.7	0
Vegetables in general.....	0	0	0	5.6	22.2	11.1
Beef.....	1.7	0	11.4	1.7	11.4	64.8

and for proteins in groups 2 and 3. They differed considerably in the values for calcium, iron, and particularly vitamin C, which showed values from 2 (in group 1) to 30 times (in group 3) as high in the individual diet records. This is explained by the amounts of oranges, Persian limes, and bananas recorded on the individual 3-day form, which in group 3 exceeded the amounts registered on the 7-day family rec-

ord by as much as nine times for oranges and three times for bananas. This brings out a serious error in family records based on the information that the housewife puts down daily by recall only. The error occurs most frequently in recording the fruits that are eaten between meals, particularly by children, often away from home, thus escaping the mother's attention. The differences found were usually

Table 7. Mean daily consumption of food per family in grams for 54 families in Jequitibá, Brazil, during two seasons, July 1957 and March 1958

Food	Group 1		Group 2		Group 3	
	July 1957	March 1958 ¹	July 1957	March 1958 ¹	July 1957	March 1958 ¹
White wheat bread.....	2 188	-----	2 143	-----	2 21	-----
Fresh beef.....	2 226	-----	107	-----	2 82	-----
Milk (liquid).....	2 1, 143	1, 367	779	1, 083	2 376	2 1, 081
Lettuce.....	2 38	0	2 103	0	64	0
Yellow squash.....	2 60	2 157	2 111	2 253	2 36	2 115
Irish potatoes.....	2 115	-----	2 136	-----	2 23	-----
Inhame (a tuber).....	17	-----	89	-----	50	-----
Bananas.....	2 7	2 295	2 85	2 236	2 24	2 193
Oranges.....	2 143	2 583	2 99	2 322	2 70	2 601
Papaya.....	93	-----	20	-----	48	-----
White wheat flour.....	2 36	-----	2 140	-----	91	-----
Condiments.....	57	-----	5	-----	14	-----
Refined sugar.....	2 369	-----	2 345	-----	2 138	-----
Raw sugar.....	2 88	-----	2 124	-----	2 523	-----
Okra.....	2 45	2 230	2 43	2 204	2 30	2 282
Tomatoes.....	9	7	39	18	24	7
Araticum.....	0	45	0	76	0	34
Lemons.....	1	18	1	24	2	13
Guava.....	0	126	0	192	0	38
Persian limes.....	0	45	0	54	0	3
Green corn.....	0	39	0	95	0	19
Avocado.....	0	158	0	83	0	43

¹ Some foods were not listed in 1958 because there was so little difference in the amounts consumed.
² Significance tested by the *t* test at 5 percent level.

Table 8. Mean nutritive values per unit of nutrition in 54 families of Jequitibá, Brazil, for two seasons

Nutritive values	July 1957			March 1958		
	Group 1	Group 2	Group 3	Group 1	Group 2	Group 3
Calories.....	2, 471	2, 793	3, 113	2, 759	3, 221	3, 057
Proteins (g.).....	72	73	73. 7	64	77	76
Calcium (mg.).....	221	172	129	318	355	367
Iron (mg.).....	14	16	26	17	12	25
Vitamin A (I. U.).....	2, 221	2, 760	2, 351	2, 813	3, 667	3, 050
Thiamin (mg.).....	1. 1	1. 3	1. 2	1. 1	1. 4	1. 5
Riboflavin (mg.).....	2. 0	. 9	1. 3	2. 3	2. 4	2. 1
Niacin (mg.).....	13. 0	14. 0	12. 0	12. 0	14. 8	15. 0
Ascorbic acid (mg.).....	38. 0	33. 0	3. 0	68. 0	74. 0	89. 3

much greater in group 3 than in groups 1 and 2, which may indicate less accuracy on the part of the housewives in group 3.

Physical Examination and Laboratory Tests

The mean heights and weights for the adult males in all three groups are 169.3 ±7.8 cm. (5 ft. 6 in. ±3 in.) and 60 kg. ±9.30 kg. (132 lbs. ±10 lbs.); for the females, 155.0 ±6.3 cm. (5 feet. 1 in. ±2.5 in.) and 51.6 ±9.2 kg. (113.5 lbs. ±20 lbs.). Table 9 shows the results of the physical examination during both surveys for the signs frequently associated with deficiency diseases.

The differences in physical findings between the groups during the first examination were not striking, except for xerosis of the skin, which occurred significantly less often in group 1 than in the other two groups. If one compared, however, the differences within the same group from one season to another, the picture

changed. The high incidence of follicular hyperkeratosis and xerosis of the skin dwindled to a very small figure in March 1958. Edema of the tongue and hypertrophy of the filiform papillae also diminished, whereas redness, edema, and bleeding of the periodontium showed a reverse trend, at least in groups 1 and 2. The possible causes for these changes will be discussed later.

The hemoglobin determinations on the blood in children aged 2 to 16 years showed that 45 percent had below 12 grams in July 1957, but only 26.9 percent were below that level in March 1958. Fewer than 10 percent had less than 10 grams in July 1957, and an even lower percentage were below 10 percent in March 1958. A new Sahli hemoglobinometer was used in the homes of the subjects for determining hemoglobin in fingertip blood.

Neck examination revealed a high incidence of endemic goiter in all three groups, with an average of 51.8 percent affected in 1957 and

Table 9. Percentage of persons from 54 families of Jequitibá, Brazil, showing signs of deficiency diseases at examination

Sign	Group 1		Group 2		Group 3	
	July 1957	March 1958	July 1957	March 1958	July 1957	March 1958
Paleness of mucosae.....	6.5	1.9	5.6	2.0	8.5	3.5
Skin:						
Follicular hyperkeratosis.....	39.5	17.5	43.5	5.9	35.1	8.1
Xerosis.....	32.6	4.7	50.8	2.0	52.1	2.3
Eyes:						
Thickening of conjunctiva.....	36.8	48.1	24.2	36.6	29.1	26.7
Spots on the conjunctiva.....	4.1	9.5	1.6	7.9	0	5.8
Circumcorneal congestion.....	45.9	68.9	52.4	68.3	36.8	52.3
Tongue:						
Edema.....	14.8	2.8	15.3	2.0	19.7	5.8
Fissures.....	14.8	9.5	7.3	8.9	12.8	17.4
Filiform papillae:						
Atrophy.....	9.0	1.9	2.4	4.0	4.3	2.3
Hypertrophy.....	34.0	15.2	24.2	10.9	21.3	8.1
Fungiform papillae:						
Atrophy.....	8.2	1.9	3.2	1.0	1.7	1.2
Hypertrophy.....	4.9	11.4	3.2	4.0	7.7	5.8
Teeth:						
Missing.....	50.0	47.2	35.5	32.7	37.6	31.4
Carious.....	50.0	58.5	65.3	68.4	60.0	62.8
Periodontium:						
Redness.....	4.1	21.7	6.5	13.9	10.3	7.0
Edema.....	3.3	30.2	5.6	18.8	17.1	7.0
Bleeding.....	1.6	10.4	4.8	6.9	5.1	8.1
Recession.....	22.1	17.9	15.3	7.9	18.8	9.3
Extremities:						
Curved legs.....	13.1	21.7	8.1	13.9	12.8	15.1
Increased calf tenderness.....	4.9	9.5	.8	6.9	8.5	12.4

¹ Differences significant at 5 percent level (X^2 test used).

56.6 percent in 1958. The majority of the goiters were small grade 1 Kimball classification (3). However, a few very large grade 3 goiters were seen in adults, and two cases of cretinism were found. Females showed a higher incidence of goiter, particularly after puberty. Four families were goiter free in 1957, but no family was found without goiter in 1958.

Fecal samples were usually examined within 24 hours after collection of specimens at the public health post of the State health department in Sete Lagoas. Each sample was examined by the direct method and by the concentration method according to Faust (4). No quantitative determinations on the amount of parasites or egg counts were done. The results of the fecal examinations, done for only 57.3 percent of the persons examined in 1957 and 63 percent of the persons examined in 1958, are presented in table 10.

Group 3 had the lowest incidence of *Giardia lamblia* and *Ascaris lumbricoides* and the highest incidence of *Necator americanus* and *Schistosoma mansoni*. Incidence of *G. lamblia* increased markedly from July 1957 to March 1958, whereas the other parasites did not show such strong difference between seasons except for a decline in the *Ascaris* incidence in groups 1 and 3 and of *Schistosoma* in group 3. These decreases, however, were due to the medical treatment these people had received.

Discussion

The county of Jequitibá where the survey was performed is a fairly typical county in north central Minas Gerais. The sample of 54

marginal farm families may be considered typical for this group; however, one must keep in mind that they represented only 26 percent of all property owners in the county (49 percent being submarginal), and that some bias may have occurred in the selection of some of the families, particularly in group 2, because of the usually underestimated size of their properties as recorded at the tax collector's office. The first impression, gained during the survey on the east side of the Rio das Velhas, that the families there (group 3) were living, in general, on a lower level than those in the other two groups, was confirmed by the result of the survey. Income and expenditures were lower; homes were in poorer condition; no privies and few storerooms were found. Group 1 usually led in such items as good condition of kitchen and stove and the possession of privies, water filters, and vegetable gardens. Here one could see the effect of educational work done by ACAR technicians over several years.

Information gathered on food habits and taboos threw some light on a very important but neglected field: the people's attitudes toward foods, which usually are formed early in life by traditions, customs, and beliefs. It revealed a realistic attitude in the expressed preferences for the foods they ate most.

The scale of nutritional values assigned to the various foods showed realistic understanding, too, in people who had not received any special training in nutrition. The designation of some foods (table 6) as "hot" or "cold" is puzzling, although it is understandable why people should call black beans "heavy" and rice "light," since beans are difficult to digest and the rice is easy. One can also understand why

Table 10. Percentage of persons found to have parasites during examination of members of 54 families in Jequitibá, Brazil

Group	Total examined both periods	Types of parasites							
		<i>Giardia lamblia</i>		<i>Ascaris lumbricoides</i>		<i>Necator americanus</i>		<i>Schistosoma mansoni</i>	
		1957	1958	1957	1958	1957	1958	1957	1958
1-----	38	18.4	47.4	23.7	10.5	60.6	62.9	0	1.1
2-----	29	17.2	44.8	37.9	34.5	66.7	62.5	1.5	0
3-----	19	5.3	15.8	21.1	0	79.7	72.4	26.3	5.3

people classify rice and beans as food "of the poor" and beef as food "of the rich," since beef is much more expensive than rice.

The most important finding in this field, however, was that a large percentage of persons had taboos which were not only unrealistic but might actually have been detrimental, promoting and prolonging ill health. Taboos relating to the postnatal diet may have serious consequences for the health and vigor of the nursing mother as well as the infant. During the postnatal period the mother should eat an abundant variety of protective foods, such as fruits, milk, and eggs; but the women studied restricted their diets to a few "preferred" items.

These taboos are confined neither to one area nor to one class. I have encountered the same taboos in other parts of Brazil, in both the north and the east. Their origin can be traced to Africa and to the Iberian Peninsula, the sources of most immigration to Brazil during colonial times. It is my impression, from limited knowledge of Brazilian Indians, that few if any of these taboos are of Indian origin.

The food consumption records during two different seasons showed a mild caloric deficiency but an adequate amount of protein, principally of vegetable origin. The supply of the B vitamins and vitamin C seems to be sufficient. A seasonal increase, particularly of riboflavin, appeared in March 1958, mainly because of greater milk consumption.

Iron intake was very satisfactory in groups 1 and 2 and excessively high in group 3 because of a heavy consumption of raw-sugar products. The satisfactory iron intake obviated iron deficiency anemia as a serious problem in spite of the high percentage of infestations of intestinal parasites, particularly hookworm. Such findings support Cruz' thesis (5) on the nutritional origin of hookworm anemia. Even the presence of the liver fluke (*Schistosoma*) in 26 percent of the persons examined in group 3 did not seem to have serious consequences in the infested persons as far as the clinical and hematological examination was able to reveal. The generally higher levels of hemoglobin in March 1958 cannot be explained on the basis of higher iron intake or lower infestation rate, because neither of these oc-

curred. The higher intake of ascorbic acid in March 1958 may have had some bearing on this change of hemoglobin levels.

The increase of redness and edema of the periodontium in March 1958 in groups 1 and 2 cannot be explained readily on the basis of nutrition because one might expect the opposite with a higher intake of foods rich in vitamin C.

The intake of vitamin A was low in all three groups during the winter, as shown in July 1957, but there was a seasonal increase during the summer, as shown in March 1958. This same phenomenon was observed with calcium, mainly because of higher consumption of milk and vegetables in March 1958. In spite of this seasonal increase, the intake of calcium and vitamin A remained considerably below National Research Council allowances (2). The same observations on calcium and vitamin A have been made in other parts of Brazil (6). They seem to be part of a general pattern.

The influence of seasonal supply on the consumption of various fruits, vegetables, and milk (table 7) does not need further comment. For some foods, the considerable differences between the intake based on the 7-day family record and the individual 3-day diet record checked by weighing individual portions pointed to the desirability of getting more individual diet records and also to extending the checking through day-by-day weighing and measuring of the raw foods used by the whole family during 7 days, with the home economist instructing and supervising the housewife during that time. Although more time consuming, this would result in more accurate data on actual food consumption by the family, as has been shown by experienced nutritionists in various countries (7).

The mean height of the men in this study was 3 cm. (1.17 inches) more than the mean given for the central area of Brazil by Medonça (8), their mean weight being the same. These men were taller than Medonça's mean for 2,281 men in Rio de Janeiro. The women, on the other hand, were 2 cm. (0.78 inches) shorter and somewhat lighter than Medonça's mean for 653 women. Comparison of the growth of the children of school age at Jequitibá with groups of the same age in Belo Horizonte (9) and

Juiz de Fora (10), both in the south central area of Minas Gerais, revealed the same phenomenon, at least in the age group 7-12 years; the Jequitibá children were lighter in weight and taller. This made the influence of a racial factor likely.

The families in the three groups showed a remarkable physical similarity. The seasonal variations in physical characteristics which occurred in all of them were striking. The dry, rough skin found as xerosis and follicular hyperkeratosis in July 1957 is usually looked upon as a sign of vitamin A deficiency due to a very low intake of milk, fruits, and vegetables rich in vitamin A or carotene. With the higher intake of foods rich in vitamin A in March 1958, these skin signs diminished greatly. However, such signs as thickening and spots on the conjunctiva of the eye, also ascribed to vitamin A deficiency, did not show the same tendency; they increased slightly. But these eye changes usually respond much more slowly to dietary changes, if they are at all reversible.

The comparison of the food pattern as shown in table 7 brought out some interesting differences: people on the east bank of the river ate much less bread, beef, Irish potatoes, and white sugar than those on the west bank. This might have been due to their greater distance from the center of trade and citylike living in Sete Lagoas, or to the higher cost of these items because of this distance. The people tried to make up for this lack of white sugar by using much more raw sugar, usually homemade, and for the lack of beef by eating more pork, usually home raised.

Endemic goiter, common among the families in all three groups, has been known to exist in Minas Gerais for many generations and has been studied by various authors (9,11,12). Viana also studied the soils and the foods grown in these soils, and found their iodine content very low (13). Iodine deficiency was probably the main cause of goiter in this area.

Summary, Conclusions, and Recommendations

Fifty-four rural families composed of 419 persons in the County of Jequitibá in the State of Minas Gerais in east central Brazil were studied between July 1957 and March 1958 in a

pilot nutritional survey. These 54 families were divided into 3 groups of 18 families each; group 1 consisted of farmers who were receiving technical and financial assistance from ACAR; group 2 farmers got technical but no financial help from ACAR; and group 3 farmers had never received technical or financial assistance. Families in group 1 were superior to those in the other two groups in regard to income, some conditions in their homes (stoves, privies, water filters), planting of vegetables and fruits, and year-round consumption of such foods as milk and beef. Correspondingly, they showed a lower incidence of dryness of the skin (xerosis) in July 1957 than the other two groups.

Since the families in group 1 had been exposed to the educational influence of ACAR technicians for some years, their better situation might be ascribed to this influence. Families in group 2 had been exposed much less to ACAR influence because of much more casual contact with its workers, and families in group 3 had never had contact with ACAR personnel.

Information obtained on their home environment showed the great need for a program of health education for these families. This need is still more accentuated if the high prevalence of intestinal parasites is considered. These infestations will vanish only if there is an intensive campaign of construction of privies; of instruction on washing the hands after a bowel movement, before preparing foods, and before eating; and, finally, of instruction on wearing shoes outside the home. To control schistosomiasis in group 3, the use of water infested with the carrier snail should be prohibited for bathing or washing clothing.

Information on attitudes and taboos in relation to foods points out a serious problem, not confined to this area. The mother, after giving birth, restricts her diet to a few foods instead of eating a greater variety of foods. This happens at the time when the milk that should nourish the new infant is formed. It will not be easy to overcome these taboos because they have existed for many generations. Before an intelligent and effective method to combat them can be found, we need to understand their origin.

The food consumption of these families

showed disharmony in the proportions of the various foods, a situation which is common not only in many areas in Brazil but also in other countries. The diet of these families consisted of an abundance of concentrated carbohydrates, such as rice, manioc meal, macaroni, and sugar, in addition to some meat and dried beans, the principal sources of proteins. There was a lack of vegetables and fruits in general, even though their intake increased from one season to the other.

Clinical examinations in conjunction with the dietary findings can demonstrate clearly to these people that their health will improve with more milk, fruits, and vegetables at the end of summer (March) because of a greater intake of such essential nutrients as calcium and vitamins A and C. Such demonstrations can motivate them to plant more vegetables for their own use during the entire year and to preserve food to be eaten during the winter. They also should learn to use more milk at home, selling less.

In the course of a survey such as this, it becomes obvious that one cannot really separate the conditions of personal hygiene, sanitation, and nutrition because they all influence the level of health. Thus, any program of education executed by ACAR or a similar organization should include these three basic fields. It is also clear that before planning an educational program, a survey should be made. People will respond to such a program only if it is based on their own specific needs.

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Signs

and

Symptoms

of trends in public health

Since 1957, the Russian scientific translation program of the Public Health Service has made available to American scientists complete texts of approximately 5,000 Russian scientific papers, totaling 25,000 pages, and about 13,200 abstracts of such papers. In 1959, 2,300 papers from 84 issues of the 9 leading Russian journals appeared in cover-to-cover translations.

« »

Public health aspects of cancer control are reviewed by Norway's Dr. Karl Evang, director-general of health services, and Dr. Einar Pederson, director of the cancer registry, in the February 1960 issue of the *Journal of Chronic Diseases*.

« »

In Ohio, the Academy of Medicine in Toledo and health officials organized a community uterine cancer detection program for the entire female population of Lucas County.

More than 110,000 pelvic and cytologic examinations have been made on 47,000 patients. Histologically proved uterine cancer was detected in 430 patients, 275 had clinically suspected cancers, and 155 had clinically occult neoplasms detected primarily by smears.

« »

Logan County, Ohio, through its health department, gives each new mother a form for maintaining her child's complete immunization record. Called "Notification of Birth Registration," the form, when completed, serves to establish the child's immunization status as well as supplying proof of age for school entrance.

Prescriptions for drugs required by its members will be filled at cost by the National Epilepsy League.

« »

Almost 950 persons a month were killed by fire in the United States during 1959, the National Fire Protection Association reports. More than 30 percent of the casualties were children, and more than one-half the estimated total of 11,300 deaths occurred in home fires.

« »

Pennsylvania is making an effort to keep Australian kangaroo meat out of bologna and other foods for human use. The attorney general claims there is evidence that 1,000 tons of "unfit" kangaroo meat has been shipped into the State, and a 2½-ton import is under embargo in Philadelphia. Kangaroo meat does not come under the U.S. Department of Agriculture Meat Inspection Act. Pennsylvania claims the meat is not inspected, properly cleaned, or refrigerated in Australia, and is not identified as kangaroo meat on the label.

« »

Nursing research is discussed in the *Journal of the American Medical Association*, May 7, 1960, by Mrs. Apollonia O. Adams, chief of the Division of Nursing Resources, Public Health Service.

« »

Smallpox cases dropped by more than two-thirds throughout the world, excluding Communist China, during 1959, the World Health Organization reports. About 72,000 cases were reported in 1959, compared with approximately 242,000 cases in 1958.

Harvard will receive \$100,000 a year for the next 10 years toward expansion of nutritional research laboratories at its School of Public Health, under a grant from General Foods Corporation.

« »

Intellectual differences between whites and Negroes are caused by continuing socioeconomic influences and are not innate racial characteristics, Ohio State University's Dr. Hilda Knobloch, associate professor of pediatrics, and Dr. Benjamin Pasamanick, professor of psychiatry, stated at the Chicago convention of the American Orthopsychiatric Association. They said, "The dichotomy between the white and nonwhite children occurs particularly in adaptive and language behavior, those areas of behavior most subject to sociocultural influences, while motor behavior, which is more a reflection of neurological status, is essentially unchanged."

« »

Almost 400 million man-days a year are lost to acute upper respiratory infections. There are 142 million acute cases per annum, according to the U.S. National Health Survey, Public Health Service.

« »

The "Citizen Apprenticeship Program" of the AFL-CIO is described as "an adventure in community understanding," designed to encourage high school students to extend their knowledge and participation in the social services of their community.

A pilot program was tested over a 2-year period among six high schools in western Pennsylvania's Shenango Valley. During 1958 and 1959, two groups of 32 high school juniors gave eight Saturday afternoons, three evenings, and a day and one-half of their spring vacation, to observe and discuss local community health, welfare, and recreation services.

A limited number of manuals and other program materials used in the Shenango Valley project was available on a "first come" basis from AFL-CIO Community Service Activities, 9 East 40th Street, New York 16, N.Y.